

DESCRIPTION OF THE LARVA OF *PHAEOGALA RUFA* ABDULLAH
(COLEOPTERA: MYCTERIDAE: LACCONOTINAE), WITH
NOMENCLATURAL NOTES FOR THE GENUS *PHAEOGALA*

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Abstract.—The mature larva of *Phaeogala rufa* Abdullah (Mycteridae: Lacconotinae) is described and illustrated, representing the first description of a mycterid larva from Madagascar. The larva of *P. rufa* is compared to all other described and several undescribed larvae of Lacconotinae. *Aeschyntelus signatus* (Grouvelle) (Bothrideridae: Bothriderini) and an unidentified chaetosomatid larva are reported to parasitize and prey upon *P. rufa*, respectively. The following new combinations and synonyms are proposed: *Phaeogala* Fairmaire 1896 = *Falsostictodrya* Pic 1931 **new synonym**, *Phaeogala biimpressa* (Pic) **new combination**; *Phaeogala breviscutata* Fairmaire 1898 = *Mimophyscius madecassus* Pic, 1935 **new synonym**, *Mimophyscius breviscutata* (Fairmaire) **new combination**.

Key Words: Madagascar, Mycteridae, Bothrideridae, Chaetosomatidae, larvae

The lacconotine Mycteridae are a diverse assemblage of 20 described genera and over 100 species, especially well represented in tropical regions of the world, but known also from temperate Australia and North and South America (Blair 1928, Lawrence et al. 1999a). The taxonomy and systematics of the group have not been treated comprehensively, although this an ongoing research project (DAP, unpubl.).

Despite the relatively large number of lacconotine taxa, only eight species, representing five genera have formally described larvae. The described taxa are: *Eurypus rubens* Kirby (Bondar 1940), *Eurypus muelleri* Seidlitz, *Stilpnonotus postsignatus* Fairmaire (Costa et al. 1988), *Lacconotus pinicolus* Horn (Lawrence 1991), *Physcius fasciatus* Pic (Pollock 1995), *Physiomorphus subcostulatus* Pollock, *Physiomorphus*

angustus Pollock and *Physiomorphus melanurus* (Champion) (Pollock et al. 2000). We add the larva of the first known *Phaeogala* species, and compare it to those lacconotines previously described, as well as undescribed specimens assembled from several collections (Table 1).

Phaeogala was described by Fairmaire (1896) in the Pedilidae, where it resided until Abdullah (1965) revised the genus (seemingly based solely on type material) and transferred the five included species to the lacconotine Mycteridae. Although Abdullah (1965) speculated that *Phaeogala* is related closely to the Chilean genus *Loboglossa* Solier, in the absence of an analysis, the phylogenetic relationships of *Phaeogala* remain unknown. Larval characters are expected to provide useful data for such an analysis, and the larval description herein is a step toward providing these data.

Table 1. Matrix of characters and character states for selected larvae of Mycteridae: Lacconotinae. Taxa indicated by numerals represent undescribed/unassociated larvae. References are given for described larvae, undescribed specimens are cited by museum Coden. Characters and character state definitions are given in the text.

Source	Taxon/Characters	1	2	3	4	5	6	7	8
Present paper	<i>Phaeogala rufa</i>	1	3	0	—	0	—	0	0
Pollock <i>et al.</i> , 2000	<i>Physiomorphus</i> spp.	1	3	0	—	0	—	0	0
Pollock 1995; ANIC; MAIC	<i>Physcius</i> spp.	0	2	2–3,5	1	2–3,5	1	0	0
Lawrence 1991; ANIC	<i>Lacconotus pinicolus</i>	1	3	2–5	1	2–5	1	2	0
ANIC	? <i>Lacconotus</i> (MI)	0	3	2–4	1	2–5	1	2	0
Costa <i>et al.</i> , 1998; ANIC, MZSP	<i>Stilpnonotus postsignatus</i>	0	0	2–5,6	1	2–5,6	1	0	0
Costa <i>et al.</i> , 1988; MZSP	<i>Eurypus muelleri</i>	1	3	0	—	0	—	1,4	0
ANIC, DAPC	“Australia 1”	1	2	2–5	0	2–5	0	3	2
ANIC	“Peru 1”	1	2	0	—	0	—	0	0
ANIC, DAPC	“Australia 2”	0	3	2–6	0	2–6	1	0	1
ANIC	“Belgian Congo 1”	0	2	0	—	0	—	1	0
ANIC	“Chili 1”	0	3	2–5	0	2–5	1	0	0

MATERIALS AND METHODS

This study is mainly based on 100+ larvae, six pupae and 14 (10 female and four male) adults collected under the bark of the trunk of a single dead tree lying on the ground at: MADAGASCAR, Tuléar Province, near Manangotry Reserve, 24°46' 38"S, 46°51'54"E, ca. 25 km NNW of Tolanaro (Fort Dauphin), 80 m elev., M.A. Ivie and D.A. Pollock, collectors. Specimens were collected over the 3 days 16–18 November 1994. These specimens, as well as additional material of larval and adult Mycteridae were obtained from or deposited in the authors' collections (DAPC, MAIC) and the following:

- ANIC. Australian National Collection of Insects, Canberra, Australia.
- MZSP. Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.
- MNHN. Muséum National d'Histoire Naturelle, Paris, France.

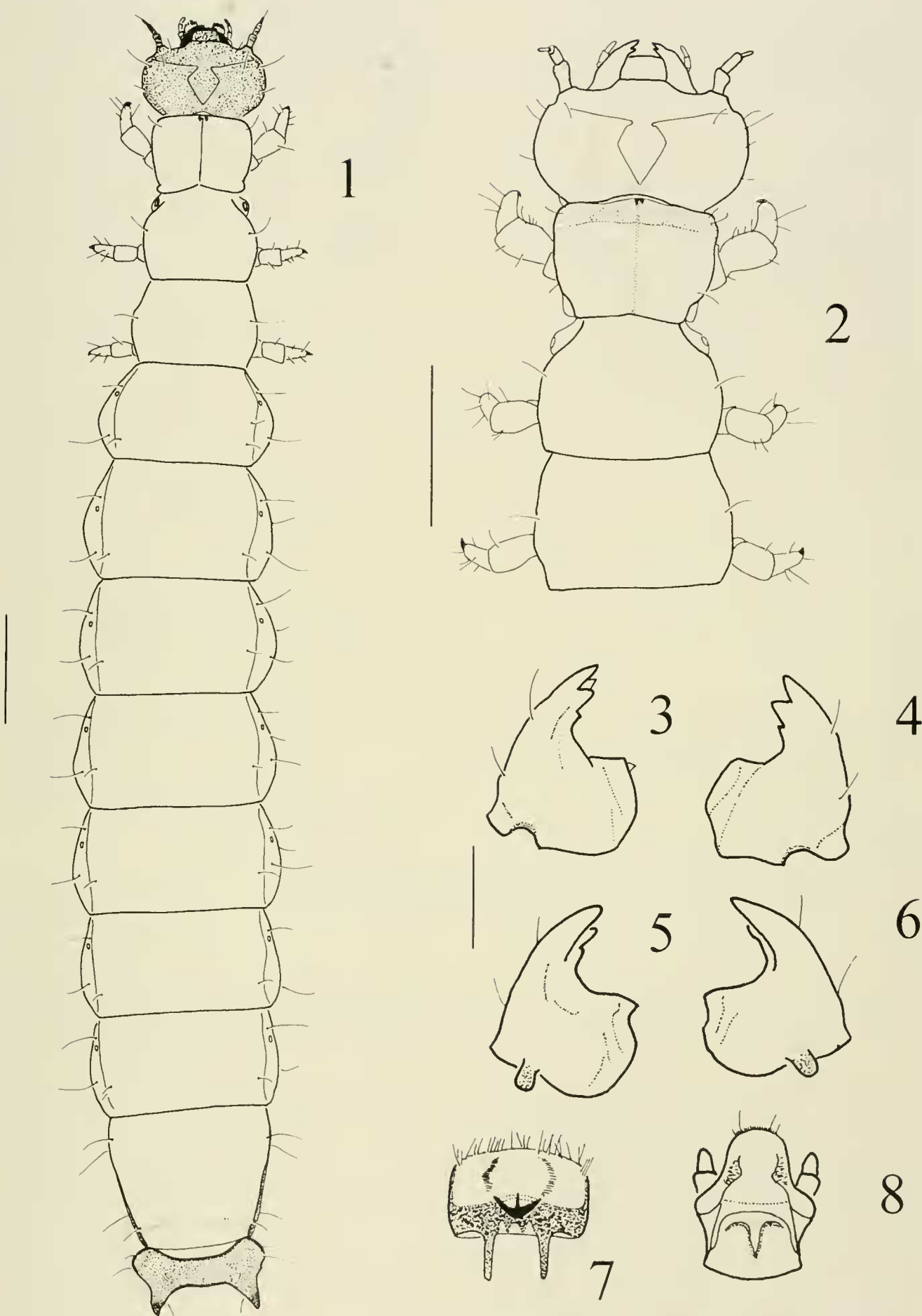
Verbatim label data from types are enclosed in quotation marks; individual labels are separated by a slash (/). Information in square brackets is added for clarity.

Diagnostic features of mycterid larvae (some of which are undescribed/unassociated) are given in Table 1. None of these

characters has been analyzed in a phylogenetic context, and character states have not been polarized. The characters are coded as follows: 1, Urogomphal pits: 0 = absent; 1 = present. 2, Number of ventral asperities along posterior margin of segment 8. 3, Number of abdominal segments with dorsal asperities. 4, Shape of dorsal abdominal asperities: 0 = linear; 1 = U-shaped. 5, Number of abdominal segments with ventral asperities. 6, Shape of ventral abdominal asperities: 0 = linear; 1 = U-shaped. 7, Posterior margin of urogomphal plate: 0 = smooth; 1 = denticulate; 2 = with 4 small tubercles medially; 3 = with single median process; 4 = with pair of median processes. 8, Abdominal spiracles: 0 = round, accessory openings around peritreme; 1 = oblong, accessory openings clustered at one end; 2 = elliptical, accessory openings forming diamond shape on either side of peritreme.

Phaeogala rufa Abdullah
(Figs. 1–11)

Phaeogala rufa Abdullah 1965: 22. Holotype. ♀, labeled “Mananjary Madag/ [thin red label] HOLOTYPE/*Phaeogala rufa* Abdullah NEW SPECIES MYCTERIDAE 618. ♀/MUSÉUM PARIS M. PIC 193” [MNHN].



Figs. 1-8. *Phaeogala rufa*. 1, Dorsal habitus. 2, Detail of dorsum of head and thorax. 3, Left mandible, dorsal. 4, Right mandible, dorsal. 5, Right mandible, ventral. 6, Left mandible, ventral. 7, Epipharynx. 8, Labium and hypopharynx. Scale bar = 1 mm (Figs. 1-2); 0.25 mm (Figs. 3-8).

The holotype of *P. rufa* is in poor condition, but appears to be conspecific with the newly collected material reported in this study.

Mature larva.—Body (Fig. 1): Parallel-sided, widened posterior to midlength, distinctly flattened dorsoventrally; lightly sclerotized except for head, tarsunguli, lateral edges of A8, and urogomphal plate; vestiture consisting of scattered setae.

Head (Figs. 1–2): Prognathous, lateral edges evenly rounded, evenly sclerotized except for unsclerotized ventral band extending from posterior extent of hypostomal rods to near anterior stemmata; epicranial stem very short; two small, incised sutures along posterior margin of epicranial plate, one on either side of midline; frontal arms V-shaped posteriorly, extending laterally to near stemmata; hypostomal rods distinct, slightly divergent posteriorly; antenna 3-segmented, ratio of antennomere lengths approximately 1:1:0.4; antennomere 1 parallel-sided basally, then asymmetrically dilated apically; antennomeres 2 and 3 parallel-sided; antennomere 2 with low, dome-like ventral sensorium; antennomeres very sparsely setose, antennomere 3 with long apical seta (missing on Fig. 2); 5 stemmata per side: anterior tightly clustered group of three, and posterior group of 2. Mandibles (Figs. 3–6) symmetrical, each apically tridentate, with single short, subapical tooth on dorsal carina; dorsal ornamentation absent; molae small, symmetrical, each with anterior premolar tooth, and indistinctly tuberculate occlusal surface. Labrum free, transverse, with pair of long discal setae and row of shorter, anterior marginal setae; posterior margin of epipharynx (Fig. 7) distinctly sclerotized, with raised W-shaped sclerome coincident with circular patch of sensilla on disc; tormae distinct, elongate. Ventral mouthparts retracted; maxilla with malar apex rounded, not cleft apically, without uncus; inner edge of mala with long tooth subapically, and several dorsally directed, thickened apical setae; palpus distinct, 3-segmented; ligula (Fig. 8) broadly

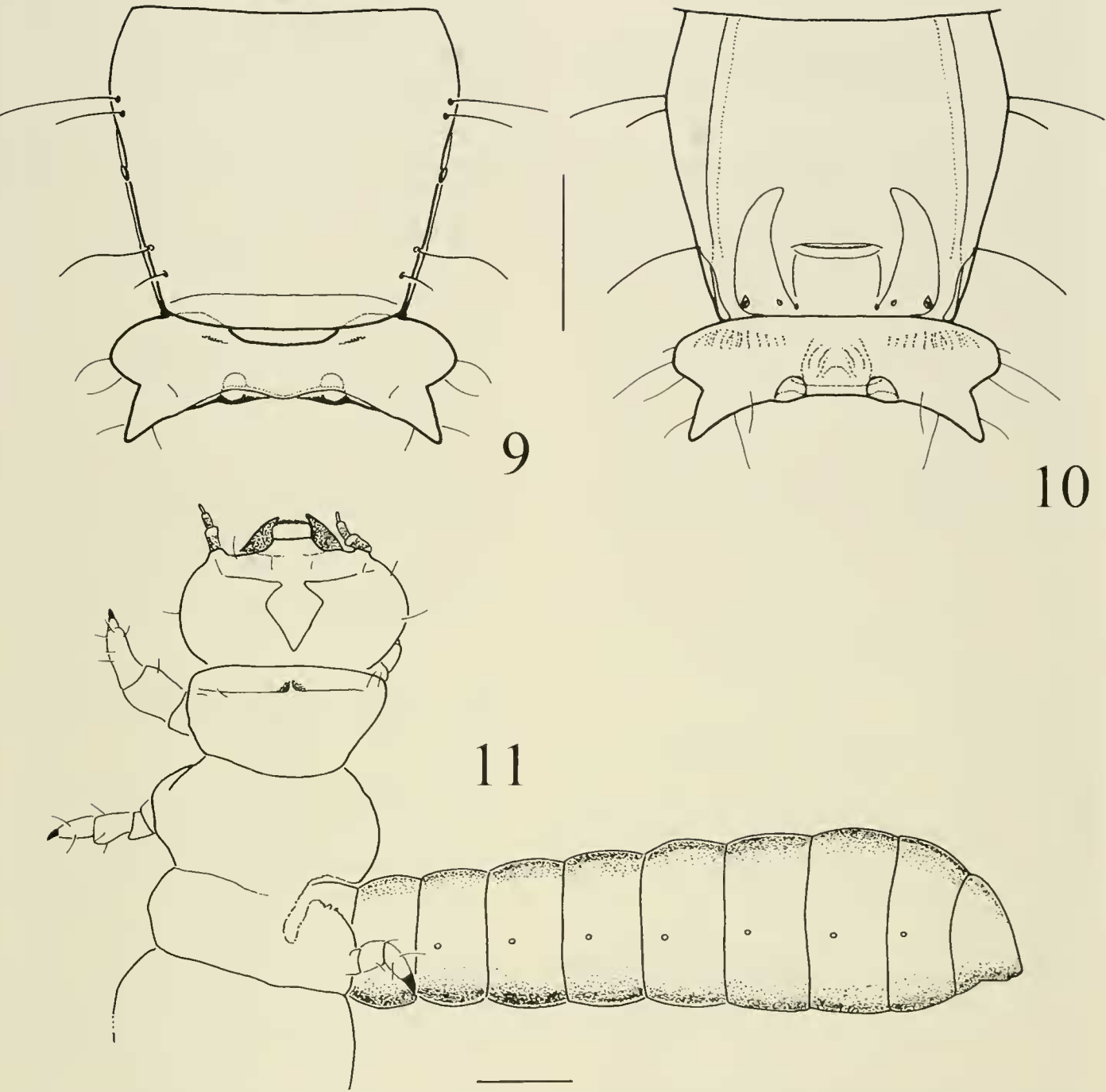
rounded or subtruncate anteriorly; labial palpus 2-segmented, distinctly shorter than ligula.

Thorax (Figs. 1–2): Prothorax transverse, sides subparallel, slightly constricted posteriorly; anterior transverse region more distinctly sclerotized; distinct medial ecdysial suture present; meso- and metathorax more or less equal in size and shape; ventrally, a distinct, longitudinal sclerotization present along midline of intersternite between pro- and mesothorax; thoracic spiracle large, slightly elliptical, annular-multiforous, with small accessory chambers along posterior wall of peritreme; legs distinct, with sparsely scattered, slender setae.

Abdomen (Figs. 1, 9–10): A1 to A7 similar in size and shape, segments broader posteriorly; A8 distinctly longer than A7; sterna and terga without elliptical patches of asperities; S8 deeply emarginate, enclosing U-shaped S9; each side of S9 with 3 asperities along posterior margin, decreasing in size medially; each side of A8 divided into several smaller sclerites in association with articulation of urogomphal plate; spiracles annular-multiforous, round, smaller than thoracic spiracle.

Urogomphal plate (Figs. 9–10) hinged to posterior margin of A8, distinctly wider than long, and wider than posterior margin of A8; laterobasally broadly lobate, produced posteriorly into pair of acute, apically upturned urogomphi; posterior edge of urogomphal plate slightly bisinuate; accessory urogomphal teeth absent; surface with minute tubercles with pores, several elongate setae on each side of plate; posteroventral surface of urogomphal plate with rugose sculpturing; urogomphal pits present, circular, oriented posteroventrally; pits separated by $> 3\times$ their diameters; setae within pits densest on ventral and anterior pit walls.

Natural history.—The habitat where our material was collected was relatively undisturbed (especially in comparison with the surrounding area), although not true primary forest. The collection locality was



Figs 9–11. *Phaeogala rufa*. 9, Dorsal detail of A8 and urogomphal plate. 10, Ventral apex of A8 and urogomphal plate. 11, *Aeschytelus signatus* larva embedded in *P. rufa* larva. Scale bars = 1 mm.

part of a forest patch being at least partially cleared through burning, even as we collected, but adjacent to closed-canopy moist, primary forest protected in the Manangotry Section of the Tsitongabarika Forest Reserve.

Larvae of *P. rufa* were found subcortically on the inner bark surface of a single unidentified dead hardwood tree with branch and bole diameters ranging from about 5 to 25 cm. The inner bark surface was rather dry, quite sound and smooth, without any loosened, friable material. This

habitat was shared with many larval and adult *Monomma* sp. (Zopheridae: Monommatinae) [MAIC]. A variety of sizes of *P. rufa* larvae were present, presumably representing several instars. Larvae exhibited preference for the undersides and shaded parts of the tree branches. Pupae and adults were found in elliptical pupal cells constructed of inner bark material. Larval exuvia were attached to the posterior end of pupae, and were collected in association with the pupae. Larvae were compared to the exuvia and the two were found to be

conspecific. All material was preserved in 70% ethanol. Larval voucher specimens of *P. rufa* are deposited in ANIC, DAPC, MAIC.

Two predatory/parasitic species were found associated with *P. rufa* specimens, both worthy of note. A single larval Bothriderini [MAIC] was found within a pupal cell with the head and part of its thorax embedded in the thorax of a prepupal larva of *P. rufa*. The parasitoid and host were preserved together, and then separated after being illustrated (Fig. 11). Three adult *Aeschyntelus signatus* (Grouvelle) (Bothrideridae: Bothriderini) were found nearby in the tunnels of *P. rufa*. They agree with the larva attacking *P. rufa* in size, and are presumed to belong to the same species (see below). This represents the first record of a mycterid host for a bothriderid (Lawrence et al. 1999b).

MAI had the opportunity to compare the three adult *A. signatus* collected from the same locality as the *P. rufa*, with a series of seven specimens (including the lectotype and paralectotype designated by Dajoz 1980) from the MNHN. Only the types had locality labels, naming the tropical far-northern city of Antsiranana (= Diego-Suarez). The other three were from the Sicard collection, and Dajoz (1980) attributed those specimens to the Montagne d'Ambre, also in the extreme north. Six of the MNHN specimens differed from the seventh and our three in size and degree of punctation. The large individuals ranged from 4.4–4.8 mm in elytral length, the intermediate specimen was 3.7 mm, while our series ranged from 3.3–3.5 mm. The larger individuals differed in having denser, deeper, and coarser punctation on the head, pronotum, prosternum, and abdomen; in the more under-cut apex of the carinate second elytral interstria; and a longitudinally grooved prosternal process. Our series had noticeably shallow punctation, especially on the venter, more truncate second elytral interstria, and a smooth intercoxal process. They also had traces of golden setae be-

tween the two patches on the second elytral interstria. The intermediate specimen, labeled December 01, is distinctly closer to the larger series in punctation density, prosternal groove, and pubescence, but has lighter punctation, and a truncate second interstria, suggesting the trends seen in our series. Therefore, we consider all of the specimens examined to belong to a single, variable, species.

A single larval Chaetosomatidae [MAIC] was also found in a pupal cell of *P. rufa*. No associated adult of this species was found, but two genera (*Malgassochaetus* Ekis and Menier and *Somatochaetus* Menier and Ekis) occur in Madagascar (Ekis and Menier 1980, Menier and Ekis 1982). This is the first report of a larva of Malagasy chaetosomatids and the first report of mycterid prey for the family, the only previously reported associations being from New Zealand, which lacks Mycteridae (Lawrence et al. 1999a).

Discussion.—The larva of *Phaeogala* shares with all other described mycterid larvae several defining characters, especially the horseshoe-shaped sternite 9, which encloses segment 10, and bearing several asperities along its posterior margin. Lawrence (1991), Pollock (1995), and Pollock et al. (2000) listed several other features of larval Mycteridae, notably the asperities on abdominal sternites and tergites, and the pair of urogomphal pits or the median process on the urogomphal plate. All mycterid larvae examined (including some undescribed taxa, indicated above in quotation marks) exhibit the U-shaped sternite 9. However, the other characters are not found in all taxa.

NEW SYNONYMS AND COMBINATIONS

In the course of this project, four required nomenclatural changes have been discovered. We take this opportunity to make these corrections.

Although *Phaeogala* was reviewed by Abdullah (1965), he failed to compare the type of *P. breviscutata* Fairmaire with gen-

era of Lacconotinae described by Pic. During examination of the Pic types of Lacconotinae, DAP discovered that the holotype of *P. breviscutata* is conspecific with *Mimophyscius madecassus* Pic, the type species of the monotypic genus *Mimophyscius* Pic. This requires the following taxonomic changes:

Mimophyscius breviscutata (Fairmaire),
new combination

Phaeogala breviscutata Fairmaire 1898: 413; Pic 1911: 22; Abdullah 1965: 20. Holotype. ♀, labeled “nossibé/[red lettering] TYPE/*Phaeogalus breviscutatus* Fairm. nossiBé/615. ♀ *Phaeogala breviscutata* Fairmaire, 1898 Holotype, det. M. Abdullah”. In Pic Coll. (PYTHIDAE), [MNHN].

Mimophyscius madecassus Pic 1935: 35. Holotype. Sex unknown, labeled “[thin, green-blue label bent in half with illegible handwriting]/Madagascar/[illegible handwriting]/[yellow] type/[red] TYPE/*Mimophyscius* ng. *madecassus* n sp”, in Pic Coll. (PYTHIDAE), [MNHN]. **New synonym.**

Another monotypic Pic genus, *Falsostictodrya*, was found to be synonymous with *Phaeogala*, producing the following new synonym and new combination:

Phaeogala Fairmaire

Phaeogala Fairmaire 1896: 353. Type species: *Phaeogala grisesens* Fairmaire, by monotypy.

Falsostictodrya Pic 1931: 17. Type species: *Falsostictodrya biimpressa* Pic, by monotypy. **New synonym.**

Phaeogala biimpressa (Pic),
new combination

Falsostictodrya biimpressa Pic 1931: 17. Holotype. ♂, labeled “Madagascar Diego Suarez/[illeg. handwritten label]/type/TYPE/*Falsostictodrya* ng. *biimpressa* Pic”, in MNHN, Pic Coll. (Pythidae) [MNHN].

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